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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/893,917	07/11/1997	KARL A. LITTAU	AM2119/T2130	8435

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EXAMINER	
ZERVIGON, RUDY	

ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
09/01/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	08/893,917	LITTAU ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-24,27 and 28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-24,27 and 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 22-24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang; Quanyuan et al. (US 5788778 A) in view of Markunas; Robert J. et al. (US 5018479 A). Shang teaches a method (column 4, lines 23-63; column 6, lines 13-23) of removing residue from a substrate processing chamber (10; Figure 1; column 4, lines 4-15), said method (column 4, lines 23-63; column 6, lines 13-23) comprising the steps of: forming a plasma remotely (46; Figure 1; column 4, lines 40-53) with respect to said chamber (10; Figure 1; column 4, lines 4-15), said plasma including a plurality of reactive radicals; forming a flow of said reactive radicals traversing toward said chamber (10; Figure 1; column 4, lines 4-15); forming a nonplasma diluent gas flow (32,34; Figure 1; column 4, lines 23-31), mixing said flow of said reactive radicals and said diluent gas flow at a mixing location ("T" location at 33) downstream of a location (where "57" is detailed) of forming said flow of said reactive radicals and anterior to said chamber (10; Figure 1; column 4, lines 4-15) to form a gas-radical mixture; and flowing said gas-radical mixture into said chamber (10; Figure 1; column 4, lines 4-15) - claim 22

Shang further teaches:

i. The method (column 4, lines 23-63; column 6, lines 13-23) as recited in claim 22 wherein said flow of reactive radicals and said gas flow are established to maintain a pressure within said chamber (10; Figure 1; column 4, lines 4-15) below one torr (column 5, lines 8-13), as claimed by claim 23

ii. The method (column 4, lines 23-63; column 6, lines 13-23) as recited in claim 22 wherein said reactive radicals comprise atoms associated with a reactive gas, with said reactive gas being selected from a group consisting of NF_3 (column 5, lines 8-13), dilute F_2, CF_4, C_2F_6, C_3F_8, SF_6, and ClF_3, as claimed by claim 24

iii. The method (column 4, lines 23-63; column 6, lines 13-23) as recited in claim 22 wherein said chamber (10; Figure 1; column 4, lines 4-15) has components therein, with a subset of said radicals in said gas-radical mixture reacting with said components creating a residue (column 6, lines 13-23) and further including the step of exhausting said residue, with a rate at which said residue is exhausted depending upon a rate of said diluent gas flow, as claimed by claim 27. When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

Shang is not specific in teaching that the nonplasma diluent gas flow comprises at least one of an inert gas or a reduction gas (hydrogen as reducing gas; column 5, lines 1-5), "as a gas used during deposition" (column 4, lines 21-22) – claim 22.

Markunas teaches a similar remote plasma apparatus (Figure 2; column 6; lines 8-48) including a plasma feed (14; Figure 2; column 6; lines 8-48) and a hydrogen "carrier gas", as reducing gas, nonplasma (18_1 - "carrier gas feed" Figure 2; column 6; lines 8-48) feed.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add hydrogen to Shang's "nonplasma" diluent gas feed as taught by Markunas.

Motivation to add hydrogen to Shang's "nonplasma" diluent gas feed as taught by Markunas is for "moderating the gas phase chemistry" as taught by Markunas (column 8, lines 45-50).

3. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shang; Quanyuan et al. (US 5788778 A) and Markunas; Robert J. et al. (US 5018479 A). Shang and Markunas are discussed above. Shang further teaches "user-selected flow rates" (column 4, lines 53-63). Shang and Markunas do not teach the method (column 4, lines 23-63; column 6, lines 13-23; column 6, lines 32-39) as recited in claim 22 wherein said diluent gas flow travels at a first rate and said flow of said reactive radicals travel at a second rate with a ratio of said first rate to said second rate being at least 2:1, as claimed by claim 28.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the relative flow rates of Shang's gas sources.

Motivation to optimize the relative flow rates of Shang's gas sources is for "achieve optimum of performance for a particualr system" as taught by Shang (column 6, lines 32-39). It would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

Response to Arguments

4. Applicant's arguments filed June 8, 2009 have been fully considered but they are not persuasive.

5. Applicant states:

"

The Office Action asserts that Shang teaches a method of removing residue from a substrate processing chamber, forming a plasma remotely (46, Col. 4, 11.40-53) and forming a nonplasma diluent gas flow (32,34, Col. 4, 11.23-31). However, gas supply 32 contains the gases that are used during deposition (column 4, lines 21-22). Other gas supplies include a source of precursor gas 44 (column 4, line 41) and gas 52. Gases 44 and 52 are used to clean the inside of the chamber after a sequence of deposition runs (column 4, lines 31-36). Because gas 32 is used during deposition and gas 44 is used after deposition, gas 32 (nonplasma diluent gas) is not mixed with the plasma including a plurality of reactive radicals (gas 44). Therefore, Shang fails to teach or suggest "mixing said flow of said reactive radicals and said diluent gas flow", as recited in claim 1

“

In response, the Examiner disagrees. Shang is cited as teaching mixing said flow of said reactive radicals (delivered from 57; Figure 1) and said diluent gas flow (32,34; Figure 1; column 4, lines 23-31) at a mixing location (“T” location at 33) downstream of a location (where “57” is detailed) of forming said flow of said reactive radicals and anterior to said chamber (10; Figure 1; column 4, lines 4-15) to form a gas-radical mixture; and flowing said gas-radical mixture into said chamber (10; Figure 1; column 4, lines 4-15) - claim 22.

Applicant states:

“

The Examiner also states that Markunas teaches a similar remote plasma apparatus (Fig. 2, Col. 6, 11. 8-48) including a plasma feed 14 and a hydrogen “carrier gas” 18. However, Markunas describes that the hydrogen “carrier gas” is used for deposition in the remote plasma apparatus,

but not for removing residue from a substrate processing chamber. Because of the purpose for deposition rather than cleaning, Markunas shows, in Fig. 2 and Col. 4, 11.45-49, that the carrier gas inlet 18 is inside the chamber 20 such that mixing occurs in the interaction region 20 inside the chamber 20. Therefore, Markunas does not teach or suggest mixing said flow of said reactive radicals and said diluent gas flow at a mixing location downstream of a location of forming said flow of said reactive radicals and anterior to said chamber to form a gas-radical mixture.

“

In response, the Examiner believes that the claimed “carrier gas” and the prior art carrier gas share the same process function. Additionally, it has been held that if the composition is physically the same, it must have the same properties. “Products of identical chemical composition cannot have mutually exclusive properties.” A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present (In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990) MPEP 2112.01).

Applicant states:

“

For the purpose of cleaning, Markunas describes an in-situ hydrogen cleaning method (Col. 13, 11.24-Col. 14, 11.26). Such a cleaning method uses dissociation of molecular hydrogen in the plasma region and transport atomic hydrogen to the substrate surface (Col. 13, 11.33-38). The hydrogen reacts with residual carbon and oxygen atoms forming volatile compounds which leave the surface. Therefore, Marknas does not teach or suggest "mixing said flow of said reactive radicals and said diluent gas flow", as recited in claim 1

“

6. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Friday schedule from 9am through 5pm. The official fax phone number for the 1792 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner

can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435

/Rudy Zervigon/

Primary Examiner, Art Unit 1792